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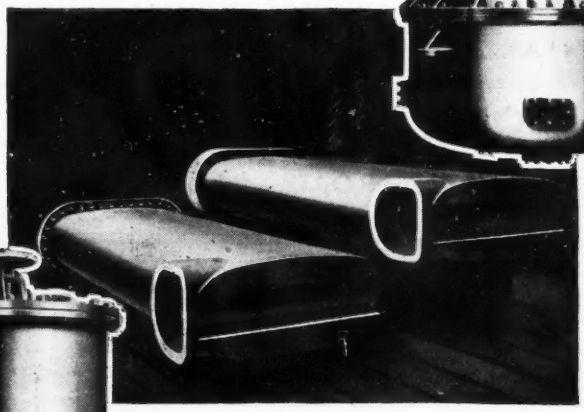

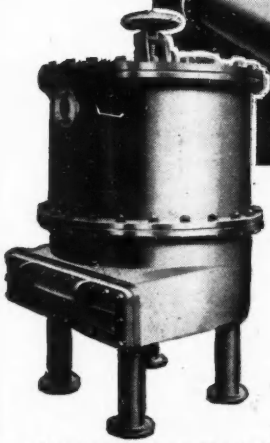

ILLUSTRATIONS.

TOP RIGHT. Jacketed Paddle Mixer.

CENTRE. Retorts in Heat-Resisting Cast Iron.

LOWER LEFT. Sulphur Burner.

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Control of Capital

THE announcement of a new policy for the control of capital issues is a matter of general interest to industry. The control of the issue of shares to the public is under the jurisdiction of the Capital Issues Committee and this Committee exercises its control in such a way as to ensure: (a) that, subject to the possibilities of the capital market and the circumstances, the order of priority of capital issues is determined according to their relative importance in the general national interest, having regard particularly to current Government policy in respect of physical investment; and (b) that, in all cases where consent is to be given, the time of raising the capital is settled with a view to preserving orderliness and avoiding congestion in the capital market.

Subject to circumstances requiring at any time a stricter control, consent will usually be given to issues of securities for the following purposes: (a) to finance directly the production or sale of exports from the United Kingdom; (b) to establish, restart, convert or expand undertakings in the "development areas" in furtherance of the policy of balanced distribution of industry; (c) to finance public utility undertakings and housing associations; (d) development of agricultural land, including the erection and repair of agricultural buildings, and of the fishery industry; (e) production and exploitation of raw materials in the United Kingdom; (f) transport and storage; (g) for such productive and constructional purposes not covered above as may be notified to the Committee from time to time by the Treasury after consultation with the other appropriate Government departments. The Committee is to give specially sympathetic consideration to (a) undertakings producing or selling for export; (b) issues required to establish or expand undertakings in the "development areas"; (c) undertakings which have been concentrated or requisitioned; and (d) undertakings which have suffered war damage.

There are many other provisions of the new policy for which the appropriate White Paper should be consulted, but this new method will, in general, be considered an advance on the old. During the war an issue of capital was permitted only if it was necessary to help the war effort. While this test will still be

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a factor in the priority of any capital issue, attention is now directed to the large amount of new capital required for re-equipping industry for peace. Everyone will agree that control cannot be completely abandoned, as this would result in such a flood of issues as would exhaust the country's present saving capacity without necessarily directing the capital into useful channels. Broadly speaking, the Capital Issues Committee now receives a standing instruction that consent should be given to issues used directly to finance the production or sale of exports, for industrial expansion in the development areas, public utilities, housing associations, agriculture and fisheries, the development of domestic raw materials, and transport. Further specific industries will be included in the approved list from time to time.

The control that is now exercised over the issue of capital must lead to some considerations in regard to the development of new businesses. Obviously, the general investing public should not be expected to finance experimental work when this is not part of an established business; in the past, the two major methods which have been used have been the provision of finance either by individual concerns who would later reap the full benefit of any success which might be achieved, or by financiers or finance corporations whose object might be to found a stable business, but was more likely to be to develop a business to the stage where it could be offered to the public through the issue of share capital at a good profit. This method has not always worked satisfactorily in the past, and there have been weaknesses both in the direction of failure to secure support for a good idea and of exploitation of the public by the issue of capital for processes which were insufficiently stable to result in a sound business.

It may be said that a good idea will always be taken up by someone, so that the inventor will never be left unsupported. That may be so, but in practice it means that the inventor who requires to take his laboratory experiments on to the practical scale before he can be sure of the results is at the mercy of the individual firm or the private financier who finds the money and provides the facilities. There is a pressing need for some Government organisation, or perhaps it would be better to say some Government-sponsored organisation, which will provide facilities for the further development of promising ideas or processes. It will be fresh in the minds of many who attended the first Baekeland Memorial Lecture that Baekeland left this country and took his ideas to America because there was no such organisation through which he could test his ideas here.

Experience suggests also that, when a process has been considered sufficiently proved to be put on to the large scale, further control of capital issue is required. There have been many instances in the past of supposed inventions, in which the public has been asked to invest large sums of money, which have proved complete failures. It is always difficult to decide in advance whether a process is going to be a success or not, but many ideas that were "hawked about the city" in times of peace were manifestly unsound to the technical man. Our view would be that capital issues to the public should continue to be controlled and that the Capital Issues Committee should have a technical staff who would be called upon to certify processes before capital issues were permitted. In this country we have to prevent, so far as possible, the fool and his money from being parted, but we also have to ensure that no sound idea is allowed to die of inanition.

The Royal Society

Foreign Relations Resumed

The senior secretary of the Royal Society, Professor A. V. Hill, left on June 26 for Copenhagen. The purpose of his visit is to convey the greetings of the Royal Society as representing the men of science of Great Britain to their colleagues in Denmark, and to discuss with them what aid British science can give to the rehabilitation of science and scientific education in their country. After three days in Copenhagen, he will proceed to Oslo for the same purpose. An extraordinary meeting of the Norwegian Academy of Sciences has been called to meet him.

It is hoped that these visits will lead to the re-establishment of the firm scientific contacts which both countries maintained throughout the world until they were overrun by the Nazis.

NOTES AND COMMENTS

Cartels and Monopolies

IT is regrettable that no earlier opportunity could have been found during the long life of the late Parliament for a thorough debate on the problem of restrictive practices, than the day before the dissolution. The war has fostered monopoly development in this country, and it is not surprising that the question of cartels and monopolies forms an important plank in the election programme of all parties. Thanks to the efforts of Mr. Ellis Smith and of his colleagues, we heard a debate that was remarkable for the absence of pre-election heat, and helped to bring the major issues involved clearly before the public. The demand that whichever party is returned should carry out a full, public, and impartial investigation into the ramifications and operations of monopolies, cartels, combines, proprietary concerns, and trading associations, was indeed welcomed on both sides of the House; it may be recalled that some leading industrialists have already welcomed this proposal. Cartels and monopolies are not always bad in themselves, and they ought to be judged by their actions and by the effects of these actions on the well-being of the country.

Danger of International Cartels

CRITICS of cartels and monopolies stand on their safest ground when they stigmatise the often nefarious international cartel agreements. We have it on the authority of Judge Jackson that "a great number among the greatest war criminals were the product of international trusts." In fact, in the United States "trust-busting" has for some time been a popular sport, but the effects of the Anti-Trust Acts across the Atlantic should not be underestimated. Public prosecution and publicity are no mean weapons in a democratic country. The ramifications of international restrictive agreements were brought to light during the war in the U.S.A., and there is in Britain now much more awareness of the dangers involved, although the House let Mr. Lyttelton get away with the absolutely incorrect claim that the tin regulation scheme—an example *par excellence* of what a cartel should not be—was not restrictionist. In the House of Lords, the Government, as a first step, has already announced its intention of setting up an independent tribunal to investigate restrictive practices. This, in order to be at all effective, must be followed by a new interpretation at law of "conspiracy in restraint of trade"; as things stand, certain restrictive practices are still allowed, no matter whether the common weal is damaged.

Spectacle Glass

DESPITE the fact that, before 1939, the white spectacle glass used in this country was imported almost exclusively from the Continent, mostly in the form of mass-produced material from Germany, yet within a few months of the outbreak of war, its production, from the raw materials to the finished article, was established on an entirely British footing, on a scale adequate to the national need, and at a standard of excellence equal to its foreign counterpart. During the past few years, indeed, this country has supplied large quantities of spectacle mouldings to the Australian market, which was previously largely served by the U.S.A., Germany, and Japan. It is hoped that this market will be retained in the future. How remarkable this achievement has been can be gauged by the intricate and highly specialised manufacturing processes entailed. White spectacle glass must have a high light-transmission factor. It must have a pre-determined angle of deflection for light, and also a pre-determined rate of expansion under heat. A high light-transmission factor can be obtained only by freedom from iron in the ingredients, especially in the sand. To obtain such freedom in as nearly as possible an absolute degree, the iron content of the glass in course of production has to be checked daily by chemical analysis, while skilled eyes keep constant watch for the first hint of discoloration. Equally careful checking controls the refractive index, which is to govern the optical performance of the lens.

Recent Developments in Analytical Chemistry—XIV

(From Our Analytical Correspondent)

WE have already commented in these articles on the disappointingly small regard for the analyst which is shown by the compilers of the Annual Reports, both Pure and Applied.[1,2] Since then, the Applied Reports for 1943 have appeared, and lend further point to those remarks. That this is not an isolated viewpoint is shown by the reasoned criticism which may be quoted from a recent article.[3] The writer, who is reviewing new techniques in analytical chemistry, complains of the way in which analytical chemistry is neglected in this country, and goes on to say: "Although two annual summaries of progress in chemistry are published, the analytical reviews leave much to be desired. The Pure Chemistry Reports give inadequate treatment of the subject and in one recent issue omitted it completely. In the Applied Chemistry Reports the subject is distributed under many different headings instead of being collected in a special section. As an example of the inadequacy of the treatment the following case may be cited. Probably no industry is so dependent on analytical control as the iron and steel industry, yet in the last three editions of Applied Chemistry Reports this field was completely ignored. The most recent edition of Pure Chemistry Reports, however, contains a section dealing with this subject, suggesting that those responsible for the compilation of these works have forgotten, through long neglect, that this subject should be dealt with in Applied Chemistry Reports."

Neglect of Analytical Chemistry

This criticism of the Reports should not, of course, be held to be a general criticism. On the whole the Reports are an excellent and essential supplement to existing chemical literature, and thoroughly merit approbation. But the analyst must be forgiven if he regards them first as an analyst and subsequently as a chemist. It is obviously impossible to deal adequately every year with every topic. But the persistent neglect from which analysis suffers is more than the result of the pressure of circumstances.

A somewhat similar complaint concerning the assessment of analysis by non-analysts is to be found in the competent review, by Chirnside, of physical methods available to the analyst, which formed the subject of his inaugural address to the Physical Methods Group of the Society of Public Analysts and Other Analytical Chemists.[4] However, enough space has been devoted for the moment to this grievance, and it can only be hoped that by the time that the next Annual Reports appear, some acknowledgment of the undoubted awakening in the sphere of analytical chemistry in this country will be evident.

Before passing on to consideration of various analytical processes in more detail, the attention of the analyst may be drawn to the two articles referred to above[3,4] for their value as reviews. The former regards the subject from the viewpoint of the analytical chemist proper. The principal topics touched on include indicators and reagents, including redox indicators; the determination of sulphate; the use of liquid amalgams for reduction; the analytical chemistry of the alkali metals; colorimetry and absorptiometry; polarography, with special reference to the determination of arsenic; chromatography, both organic and inorganic; rapid combustion methods applied to steels, coal, and organic compounds; gas analysis, thermoanalytical methods; and, finally, microanalysis. A number of the topics dealt with have already been considered in various of the articles in this series, but the analyst may find this a useful review offering a number of new viewpoints.

Two Valuable Reviews

The second of the review articles shows rather the approach of the physicist to a series of problems proposed by the chemist. The application of various portions of the electromagnetic spectrum, from the infra-red spectrum to the electron, are briefly viewed: gas analysis by physical means, the use of the mass spectrograph, polarography, and absorptiometry are also dealt with. This article is useful in showing clearly just how the use of physical instruments has altered the technique of the analyst—one would be quite safe in using the term "revolutionised"—over the past twenty years or so. At one stage there appears to be a certain misconception concerning terms. Mr. Chirnside, in describing methods of gas analysis which handle as little as 0.001 ml., says: "I do not wish to offend the susceptibilities of the Michrochemistry Group on this occasion, but even their methods do not meet the situation, although several ingenious techniques have been employed to analyse as little as 0.1 ml." Mr. Chirnside would here appear to assume that the microchemist must only use recognised chemical techniques, a point of view which would promptly rule out of court about 99 per cent. of all existing microchemical techniques. There is no basic

rule to prevent microchemists from employing methods which come into the category of physical methods; and his use of those methods makes him no less a microchemist. As long as he carries out chemical analyses (either by physical or chemical methods) on small quantities of material, with no lower limit but that of his ingenuity, he is still a microchemist. His methods are microchemical although they may be physical. And, therefore, the method described by Mr. Chirnside, although devised by a physicist, is none the less microchemical.

This may seem but a small point, but it is felt to be worthy of some stress. It would be a pity if the impression in some quarters that the Physical Methods Group, founded so shortly after the Microchemical Group, is in any way a rival body, were not dispelled before it has any opportunity to take hold. The two bodies must of necessity overlap very considerably in their interests. It would be preferable, then, that this overlap should be to their mutual benefit, and that there should be no suggestion that because of special powers or attributes one is better than the other.

Several reagents proposed for the detection of bismuth are worthy of note. Whelan and Welcher[5] propose α-picoline methiodide for this purpose. They describe the preparation of the reagent from methyl iodide and α-picoline. It gives an orange-red precipitate or colour with as little as 0.4μg. of bismuth, when the detection is performed as a spot test. The reaction may, however, also be used on the ordinary macro scale. Silver, unless in small amount, mercurous mercury, copper, and iodine interfere with the reaction, but small amounts of lead, mercuric mercury, and tin do not. In order to make best use of the reagent, the authors suggest that it should be used as a confirmatory test in the usual systematic analysis, after separation of the bismuth, as preferable to reduction with sodium stannite.

Detection of Bismuth

Owing to the dearth of really satisfactory bismuth reagents, West and Tokos[6] investigated a number of reagents that have been proposed from time to time for its detection. From all those tested they chose two as being outstandingly useful. Thiourea, already well-known as a useful reagent,[7] they found to be useful, though not especially sensitive. A drop of the solution to be tested is made acid with 0.1 *N* nitric acid, and then treated with 5 per cent. aqueous thiourea solution, a yellow colour indicating the presence of bismuth. The test is interfered with by antimony, palladium, mercurous mercury, and coloured ions. It is elsewhere stated[7] that the antimony interference may be suppressed by adding fluoride. The limit of identification by this test is 1.5 μg. of bismuth.

Brucine citrate reagent solution is prepared by dissolving 100 g. of citric acid in 100 ml. of water, adding 12 g. of brucine, and heating until this is dissolved. Three other solutions are required in conjunction with this, one containing equal quantities of molar boric acid and sodium hydroxide, a saturated aqueous solution of sodium bisulphite, and a 20 per cent. aqueous solution of potassium iodide. By placing a drop of test solution on a spot plate, and adding in order a drop each of the boric acid. sodium bisulphite, brucine citrate, and potassium iodide solutions, a brick-red precipitate (or a deep orange precipitate if cadmium, mercury, copper, silver, or lead, which render the test less sensitive, are present) will indicate the presence of 0.3 μg. of bismuth. It is claimed that the test is quite satisfactory without previous separation of the bismuth, the only common ion which may interfere seriously with the test being mercurous mercury, which gives a black precipitate in these conditions.

Estimation of Bismuth

Yao[8] has developed a method for the determination of small amounts of bismuth in the presence of copper in bulk. The principal problem is the separation of the two metals, and this is carried out by oxidation, in the solution, of permanganate to manganese dioxide, using bromide. The manganese dioxide carries down the bismuth (it is recommended that two precipitations of dioxide should be made to remove the last traces of the bismuth) and the precipitate is filtered off. It is redissolved in sulphuric acid/sodium sulphite, made alkaline, and cyanide is added On the addition of a carbon tetrachloride solution of dithizone (diphenylthiocarbazone) in excess, any metals which form dithizonates on the alkaline side (usually only bismuth and lead in these conditions) will be extracted. Acidification of the carbon tetrachloride layer breaks down the lead and bismuth complexes, returning the metals to the acid layer. The *p*H is adjusted to 3, preventing re-formation of the lead complex, which exists only on the alkaline side. Titration against a standard solution of dithizone is the method used for the final estimation. The dithizone solution, which is green, is added in small amounts with shaking, forming the bismuth complex, which is orange. The layer containing this is drawn off after each addition. When the green colour of the dithizone remains unaltered on shaking, the end point has been reached. A precision of ± 3 μg. is claimed for the method, for quantities of bismuth of the order of 10-60 μg., contained in samples of copper as large as 15 g.

The estimation of bismuth in the presence of magnesium is possible, using 8-hydroxyquinoline.[9] Various authors[10] put the lower

limits of *p*H for the precipitation of the 8-hydroxyquinolates of bismuth and magnesium at 4.8 for bismuth, and anywhere from 5.5 to 7.5 for magnesium. These figures suggest that probably bismuth might be separated from magnesium in the range 4.8-5.5. Haynes, on investigation, narrows this to the range 5.2-5.5. By careful buffering to this range with a sodium acetate/acetic acid buffer, the bismuth hydroxyquinolate is precipitated and filtered off. It is redissolved in dilute hydrochloric acid and titrated by standard bromine and thiosulphate. Magnesium may be estimated in the filtrate by rendering it alkaline with ammonia, collecting the precipitate, and titrating as for the bismuth complex.

Majumdar,[11] basing his work on the known slight solubility of bismuth arsenate, has investigated organic arsenical compounds as precipitants for the element. Between *p*H 5.1 and 5.3, obtained by an acetate/acetic acid buffer, bismuth is quantitatively precipitated by phenylarsonic acid. The precipitate is filtered hot, washed, dried at 110-120°C., and weighed. Separations of bismuth from a number of other elements are possible, and are described in some detail. The same author describes[12] a colorimetric estimation of bismuth, using dimercaptothiodiazole, which normally gives a red precipitate with the element. A solution of gum acacia causes the complex to form a stable coloration instead of a precipitate. This is suitable for the colorimetric determination of small amounts of bismuth in the presence of considerable amounts of zinc, ferrous iron, and manganese. It is possible to apply this reaction to the precipitate obtained with phenylarsonic acid as described in the previous method.

Finally, the polarography of dilute acetate-buffered bismuth solutions, in which the bismuth is held as complex tartrate, has been investigated by Swinehart, Garrett, and MacNevin.[13] In ordinary solution in hydrochloric acid, polarography for bismuth is unreliable, but under these conditions a precision of 1 mg. per litre is possible if the *p*H is accurately controlled. A manually operated polarograph was used.

Detection of Zinc

White and Neustadt[14] have proposed the use of benzoin to detect zinc through a fluorescence reaction. The test solution is made neutral or slightly alkaline with sodium hydroxide, and filtered. Sodium silicate is then added, followed by sodium dithionate solution, which acts as a reducing agent, preventing oxidation of the benzoin. Benzoin solution, followed by magnesium nitrate solution, are then added, and the whole is shaken and observed under ultra-violet light. In the presence of the magnesium hydroxide and silicate, 10 μg. or more of zinc produce a green fluorescence. The fluorescent range is from 4650 to 5700 A.U. Beryllium, boron and antimony give fluorescences which interfere, while coloured ions should also be absent.

A crystal test which is suitable for the identification of zinc, among other metals, is described by Eisenberg and Keenan.[15] A drop of 0.5 per cent. picrolonic acid in 50 per cent. ethanol is added to a test drop on a slide, and observed for the formation of crystals, using a magnification of 200 diameters. Yellow needles and rods are formed by zinc, copper, sodium, and potassium ions, and further tests are needed to distinguish these. (Strontium and ammonium also form crystals, but these may be recognised by inspection.) The preparation is allowed to dry, and the refractive indices and other optical properties determined by the usual methods.[16] The minimum refractive index, n_α, for zinc is 1.650, and there is an intermediate refractive index, n_γ, of 1.734. Parallel extinction and positive elongation are also shown. Using these facts, a definite distinction can be made between zinc and the other cations.

Determination of Zinc

The gravimetric determination of zinc on the micro scale, using anthranilic acid,[17] has been further investigated by Wenger,[18] with a view to determining the optimum temperature of precipitation. This is found not to be critical, since precipitation both at room temperature and from boiling solution gave equally satisfactory results. In this connection it may be stressed that the temperature of precipitation for cadmium, which may be estimated by the same reagent, may, if altered, cause some change in the completeness of precipitation.

A turbidimetric method for zinc, using 8-hydroxyquinoline, has been devised by Merritt.[19] The 8-hydroxyquinolate is precipitated in the presence of gum arabic, a method which has already been used qualitatively. From 0.05 to 0.60 mgm. of zinc give a measurable turbidity which is related to the zinc content, in the absence of other ions which would be precipitated in similar conditions of *p*H (acetate/acetic acid buffer). The turbidity is highly reproducible, the accuracy being of the order of 0.02 mgm. of zinc, and a single determination can be carried out in about 3 minutes. Using calibration curves prepared with varying amounts of magnesium also present, it is possible to estimate the zinc in the presence of this element. So far it has not been found possible to extent the method to determine either magnesium or aluminium, since the turbidities produced by these elements are not sufficiently reproducible.

Merritt and Walker[20] have examined the properties of 8-hydroxyquinaldine (the 2-methyl derivative of 8-hydroxyquinoline) as an analytical reagent, and have found that

the new reagent is somewhat more selective than its parent compound. For example, 8-hydroxyquinaldine does not react with aluminium. It is possible to estimate zinc and magnesium, or zinc and aluminium, in a single solution, as a consequence. Zinc is precipitated by 8-hydroxyquinaldine in acetic acid/acetate solution, the precipitate of the zinc complex being either estimated gravimetrically or dissolved up in acid and titrated with standard bromine and thiosulphate. By raising the *p*H to 9.3 with ammonia, the magnesium complex is next precipitated, and treated similarly. For gravimetric determination both these precipitates are dried at 130°-140° C. Aluminium, which may be held in solution by tartrate during the zinc precipitation, so that basic aluminium salts are not precipitated, may be brought down from the filtrate freed from zinc by the addition of 8-hydroxyquinoline, and estimated gravimetrically or volumetrically. Since, unfortunately, the presence of tartrate interferes seriously with the precipitation of magnesium 8-hydroxyquinaldinate, the three ions cannot be determined satisfactorily if present together, since the precautions required for the aluminium prevent satisfactory results for the magnesium.

Volumetric Methods

A number of workers have investigated various titration procedures for zinc. In the titration with ferrocyanide, a solution of *o*-dianisidine in sulphuric acid is suitable as indicator, changing from red-brown to pale blue-green.[21] Ferrocyanide titrations are also used by Micelli and Larson[22] for the estimation of zinc in cyanide brass-plating baths, and by Miller, Boyle, and Neill[23] for its estimation in magnesium alloys. In the former case copper is first removed by electrolysis. The titration is a direct one, using diphenylbenzidine in phosphoric acid as indicator, and titrating the zinc with a ferrocyanide solution containing ferricyanide, as in standard methods. The latter method precipitates the zinc with an excess of standard ferrocyanide-ferricyanide, and the excess ferrocyanide in the filtered solution is then in turn estimated by titration with ceric sulphate, using the *o*-phenanthroline-ferrous complex as indicator.

Volumetric estimation by oxalate is described by Elving and Lamkin.[24] The solution of, *e.g.*, a brass, is first electrolysed to remove copper, and manganese is precipitated with persulphate. The solution is now made strongly acid with acetic acid, and the zinc is precipitated with ammonium oxalate. This precipitate is dissolved in warm dilute sulphuric acid, and titrated directly against standard permanganate.

Finally, by a modification of Lang's method,[25] zinc in magnesium alloys may be estimated iodometrically.[26] Copper and manganese are removed, the former by precipitation with lead, and the latter by persulphate. If iron is present, citrate is added to form a non-interfering complex. The slightly acid solution is then treated with excess potassium iodide, followed by potassium ferricyanide, the liberated iodine being estimated by standard thiosulphate. If the alloy contains more than 2 per cent. of zinc, the estimation is carried out directly, but with lower amounts the zinc may either be concentrated by a sulphuretted hydrogen precipitation, or a known amount of standard zinc sulphate solution should be added.

Miscellaneous Methods

The method previously employed by Cholak and his co-workers,[2] of extraction of an ion with an organic reagent, and subsequent estimation by some physical method, has been extended by them to the determination of zinc.[27] The ashed biological material to be investigated is treated with a chloroform solution of di-β-naphthylthiocarbazone (in preference to dithizone). The zinc complex may, if the amount of zinc is very small, and cadmium is absent, be measured colorimetrically. However, in the presence of more than 0.05 mg. zinc in 10 ml., or in the presence of cadmium, it is recommended that the final determination should be by the polarograph.

Electrodeposition of zinc from an ammoniacal solution containing ammonium chloride affords a rapid and accurate method of determining zinc in magnesium alloys.[28] The presence of ammonium chloride prevents precipitation of the magnesium, while aluminium may be retained in solution by the addition of tartaric acid. The electrodes may be of nickel, or of platinum plated with copper.[29] A 2-amp. current is passed for 20 minutes, and the whole determination is completed in 25 minutes. By carrying out the whole process in a single vessel, there are no losses through transference. Care must be taken to avoid oxidation of the freshly deposited zinc, especially while it is being dried. To this end, it is essential that the underlying copper plating should not be oxidised. A nickel cathode is consequently rather better for the determination. If lead, tin, cadmium, copper, or silver are present in appreciable amount, they should be removed by a preliminary precipitation with sulphuretted hydrogen.

A final method may be mentioned, which deals with the special problem of the determination of the zinc in zinc naphthenate, either in the form of petroleum ether solutions or in aqueous emulsions.[30] Hydrolysis with hydrochloric acid splits the metal from the naphthenic acid, and shaking with petroleum ether leaves the zinc in the aqueous layer, which is drawn off. Formation of emulsions at the interface is prevented by the addition of a small amount

of isopropyl alcohol. The zinc is then determined by any standard method, such as titration with ferrocyanide. A parallel procedure may be used for the determination of copper in copper naphthenate.

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30 WEATHERBURN, WEATHERBURN, and BAYLEY, *Ind. Eng. Chem., Anal. Ed.*, 1944, *16*, 703.

Turkish Mining Activities

Last Year's Figures

PRODUCTION of most minerals remained at a high level in Turkey in 1944. Stimulated by increased demands from the State Railways and industry, bituminous coal output reached a record of 3,530,000 metric tons as compared with 3,162,605 in 1943, and lignine output reached a new high of 760,000 tons (588,706 in 1943). Distribution, however, continued to be hampered by inadequate transport facilities, resulting in coal shortages in a number of areas.

Chromite production dropped to 150,000 metric tons from 196,836, of which 67,727 tons were high-grade Guleman lumpy ore, compared with 60,000 tons in 1943, 31,165 in 1942, and 63,996 in 1941.

Iron ore production, which was sufficient for domestic needs, totalled 90,000 tons, as compared with 91,751 in 1943. The Karabuk iron and steel plant, located at a distance from iron deposits, but close to coal, is the only producer in Turkey. Operation in 1944 was not at capacity, and production did not exceed an estimated 69,000 tons. Substantial quantities of pig iron are reported to have accumulated. A plan is under consideration for the control of distribution of all imported and domestically manufactured iron and steel products.

Copper Production Plans

Copper production consisting of 14,000 tons of blister copper of 98.5 per cent. purity, and 2000 tons of refined of 99.5 per cent purity, exceeded 1943 output. Reserves having been exhausted at Kurvashan, the smelter and mine were closed at the end of the year. The exploitation of deposits near Murgil is planned, as well as a new installation, designed to treat 1500 tons of ore a day. Turkey is not self-sufficient in manganese, as only a few hundred tons a year are produced, and she needs between 4000 and 5000 tons annually.

Following the policy of awaiting receipt of orders for emery before producing the ore, emery production in Turkey is practically at a standstill, while sulphur output (2600 tons of 70 per cent. sulphur, and 650 tons of refined sulphur) covered domestic needs.

Colombia's new cement plant, under construction near Montebello, about 55 kilometres south of Medellin, is expected to begin operations in 1946. This cement company, with an authorised capital of 6,000,000 pesos, will be a part of the Empresa Siderurgica, at present the only steel-manufacturing plant in Colombia. Capacity of the new plant is about 450 tons.

Research and Development

Select Committee's Report

THE 99th report of the Select Committee on National Expenditure bears the title "Research and Development: War-like Stores."

The committee concludes "that there were many examples of wasteful expenditure on war-like stores of all kinds which it would serve no useful purpose to enumerate." These conclusively show that the daily cost of this war, at least during the earlier years, was unnecessarily increased and the duration of the war prolonged because (i) research had for long been starved; (ii) adequate steps had not been taken to maintain during the years of peace a nucleus of skilled men which could be rapidly and efficiently expanded for the purposes of war; and (iii) the system of departmental responsibility was not sufficiently flexible to meet the changed requirements to the full.

One of the main lessons of modern war has been the essential need for maintaining the closest contacts between all three fighting services and a fully co-ordinated control over their operations in the field. The necessary corollary to this is the establishment of similar contacts and controls in the field of their supply services and of the basic research upon which these in their turn must rely. At the outbreak of war, each fighting service was primarily responsible for developing, through its own supply organisation, the weapons and stores it required. This inevitably resulted in parallel and not fully co-ordinated advances in certain fields where more than one service was interested. There has been a certain degree of overlapping, in spite of later efforts made to minimise this by means of inter-service committees. Attempts to solve these major problems of administration and Government organisation must lead to reconsideration of the present allocation of departmental responsibilities. These are matters outside the scope of the committee, but it is convinced these problems must be squarely faced and attacked with the least possible delay.

Block Grants Advocated

On the financial side there are considerable difficulties to be overcome, which may well call for a detailed re-examination of the methods at present employed for the voting of money for research and of accounting for its expenditure. Again, these are questions which lie more within the scope of the Committee of Public Accounts than of the Select Committee on National Expenditure. Nevertheless, the inquiries made by the Select Committee during this war have heavily underscored the fact, already long known to those who had direct experience of applying money to research, that the methods of control and accounting most suitable to ordinary administrative expenditure are not necessarily those that lead to the most fruitful achievements of results in research. In particular, money voted for research cannot be most advantageously expended if it is tied down by a detailed and rigid annual estimate. What is needed is that block grants should be sanctioned for specified periods of years. The detail of the expenditure actually incurred out of such grants would, however, have to be accounted for at appropriate periods.

Development Work Vital

There are the further problems of securing the maintenance, both in industry and under Government control, of active and fully skilled organisations, together with the necessary machine tools and equipment, for the development of the new results flowing from establishments concerned with basic research and for the carrying out of specific applied research, and the linking up of all these establishments in such a way that the fullest unity of purpose can be maintained between research, manufacture and operational requirements. It is of first importance that the permanent cadre of the fighting forces should always have available during peace-time an adequate quantity of the most up-to-date weapons and stores that continuing research and development can provide. This experience should be fully shared with the Dominions, and they should be invited to co-operate intimately at all stages of research, design, development, production and trial.

The committee fully recognise that in spite of the heavy disabilities, enumerated at the outset, excellent results have in many instances ultimately been achieved by ingenious and sensible improvisations and by the unremitting work of individuals and organisations in science, industry and the public service. But this does not weaken the force of the conclusions stated. An excellent example of the results that flowed from the prosecution of active research during the years before the war is to be found in the development of the Hurricane and the Spitfire, which had already by the outbreak of war been brought to a state when they could be put into immediate production. What the possession of these aircraft, developed on the initiative of the aircraft industry, meant to this country is a matter of history.

It is no part of the committee's duty to indulge in a historical analysis of why the state of affairs existing in 1939 had been allowed to develop. They are concerned solely that the same mistakes should not be repeated. In this connection it must in justice be emphasised that, though the Select Com-

mittee have, from the nature of their task, had to direct criticism to many fields of war expenditure, they have seldom found cause for complaint in the discharge of official duties by the individuals entrusted with carrying these out. Critical examination has revealed weaknesses inherent in the system and roughness in its machinery rather than failures in the execution of allotted tasks. These weaknesses should have been foreseen; but having now been fully recognised, immediate and vigorous action should be taken to put them right.

Need for Generous Outlay

On the narrow view, it can be argued that under their orders of reference it is not for a Select Committee on National Expenditure to recommend the increased disbursement of public money. This committee and its predecessors during this war have unhesitatingly rejected this view. National economy can be firmly based only on the best outlay of the nation's resources. If research and development are not maintained at a high level and encouraged by the right methods of control and co-ordination and if terms of employment which will attract the best brains to the service of the State are not offered, the nation's bill for the equipment and maintenance of its forces in a state of fighting efficiency will be disproportionately large, and that in the long run uneconomic restriction in research expenditure and the failure to evolve means of securing the closest contacts between the scientist, the manufacturer and the fighting man must inevitably lead to gross extravagance and perhaps imperil the existence of the nation.

Parsimonius Attitude Condemned

Owing to a parsimonious attitude towards research and consequent unpreparedness, the first two or three years of the war were spent by scientists and research workers in a strenuous attempt to make up for lost time. Consequently, lessons from the battlefield could not be applied in time for the new weapons so urgently required to reach the hands of the fighting forces during the most critical years. The recurrence of these difficulties can only be prevented by securing the technical initiative during the years of peace and successfully welding this to the war potential.

It is equally essential to have at the service of the State trained scientists, inventors and manufacturers whose continuing preoccupation with the problems of warfare will render them the more capable of speedily producing antidotes to new and unsuspected enemy devices. Production binds the thought of the scientist to the weapon of the fighting man. The committee concludes by recommending that this should be one of the first problems to which the new Parliament should address its close attention.

Recent Italian Researches

Fungicides

THE scarcity of copper and the development of vine-growing have led Italian technologists to undertake the serious study of the fungicidal action of copper quite independently of the official campaign. Among the most important and effective efforts in this direction may be mentioned the researches on compounds of copper and organic acids (by Professor Casale) and on copper-ammonium compounds, because of the much lower consumption of copper in comparison with the classical Bordeaux mixtures. Studies of the constitution of the various types of Bordeaux mixture by means of X-ray analysis have been carried out by Professors Baroni and Marini-Bettola, and they have come to the conclusion that the only effective fungicidal constituents of the Bordeaux mixtures are certain basic sulphates of copper. At the same time Professors Malquori and Borzini have studied, from both the chemical and the fungicidal point of view, certain special copper-containing bentonites, which have already given excellent results.

Floral Colouring Matter

It is well known that flowers contain a number of coloured pigments belonging to the anthocyanin, flavone, polyene, quinone and other groups. Among these, the flavone colouring matters are of particular importance because of their constitutional relations not only with the anthocyanins but also with the catechins, one of the most important groups of natural tannins.

As early as 1910, Professor Bargellini had completed systematic studies on the nature of these substances which had led to his successful synthesis of scutellarein, baicalein, etc. With his collaborators he has recently resumed these studies, paying particular attention to the possibility of synthesising derivatives of 6-7-dioxyflavone, and he has at the same time added to our knowledge of the styryl-chromones and furyl-chromones. His team is now engaged in studying the synthesis of polyoxyflavone derivatives, and their work on the 6-7-8-trioxyflavones has already been published Work now in hand deals with the 5-7-8-trioxyflavone group, in which particular interest is presented by carthamidin, gossypetin, and herbacetin.

Transferred to I.C.I.'s plant at Blackley for the manufacture of Mepacrine, Mr. Walter Ogden (*see* Birthday Honours in last week's issue), in spite of the fact that he had seen eight colleagues incapacitated by dermatitis, undertook the job of powdering Mepacrine alone, continuing for two-and-a-half years and working a seven-day week.

Inventions of Employees

Suggestions for Improved Conditions

by S. MITTLER, A.F.R.Ae.S., A.M.I.Mech.E.

IN an article *Patents or Premiums*, published in the American *Journal of the Patent Office Society* in July, 1944, John Boyle, Patent Attorney, Washington, D.C., gave a survey of the remuneration of inventors by premiums as practised in several countries. He comes to the conclusion that any such system is unsatisfactory and ends his article with the words: "Only by letting the inventor become a partner in the profits and savings from the patented invention is the reward in compliance with the intent and spirit of the Constitution. In the controversy that rages around the patent system the inventor seems to be the forgotten man."

In this country a Royal Commission for the Reform of the Patent Law has been set up which is officially called the Patents Committee, 1944, Board of Trade, and better known under the name of Swan Committee. This committee is investigating the question of the prevention of misuse of monopoly by the patentee and its first report will be discussed in a subsequent issue. In the public discussion of this question it has been said (*The Times*, January 3, 1945, p. 5) that ". . . the bulk of valuable discovery results from continued research, paid for by entrepreneurs . . . who must receive a sufficient reward to develop inventions commercially." But the entrepreneur is, in this age of division of labour, rarely himself the inventor: the actual devisers of the inventions are either free-lance inventors or employees, and it is with the position of the latter that this article is mainly concerned.

The British Patents and Designs Acts, 1907 to 1942, prescribe that (with the exception of applications made under International or Colonial Arrangements) the true and first inventor has to be the applicant or one of the applicants of a patent application. This is (apart from communications from abroad) the actual deviser of the invention.

Financial Rights

The honour of the inventor has been, since 1939, safeguarded by the Patents and Designs Act granting him the right to be mentioned as such in the patent, regardless of whether the patent is granted to himself or to an assignee. However, the financial rights in the patent are not governed by the patent law but by common law, according to which the employer can demand the transfer of the patent application from an employed technician or scientist without having to pay any consideration for it in addition to the wages or salary received by the employee, however modest this may be.

If the employee takes out a patent in his own name he is considered to hold it in trust for the employer who may at any time, even years after the employee has left his employ, demand the transfer of the patent against refunding of the actual disbursements of the inventor for patent-office or patent-agent's fees, etc.

A Judge's Dilemma

It has been recognised by high authorities that this state of affairs is not altogether satisfactory. For example, Mr. Justice Farwell in the Chancery Division said in the case of *Adamson v. Kenworthy*, (R.P.C. 49/57): "That being the law as I understand it, in some cases it may seem to work hardly upon the employee. Taking the present case, the defendant was a person receiving a comparatively small wage, a man of ability and, I have no doubt, of some inventive faculty, and it may seem hard that the fruits of his brains and labours should belong to his employer . . . (but otherwise he) would be entitled to prevent the employer from making use of that design without coming to some agreement with him, the employee, as to the terms upon which it was used. It seems to me that that would be a position which would be almost impossible."

It will be shown later that there are other alternatives which would lead out of the judge's dilemma. The psychological effect of the present position is, undoubtedly—and everyone with experience in patent and personnel matters will confirm this—that an employee who finds himself excluded from a share in the financial benefits derived by his employer from his invention will develop a grievance which will either hamper his inventiveness altogether or will induce him to try and circumvent the law, either by holding back his inventions or by getting them patented under a cover name, a practice which is very hard to uncover. This is certainly in nobody's interest. Enlightened employers have felt that long ago; but it appears to be inconsistent with the present development of economic, as well as political, democracy, to make the employed inventor dependent on his employer's sense of fairness. Systems of small bonuses allotted to inventors at the discretion of their employer have, probably for this reason, proved of very limited success.

If, however, the inventor were *entitled* to a fair deal, his inventiveness would be stimulated by the incentive of gainful enterprise, and the employer, while parting with a proportion of his gain, would in the long run derive more benefit from the fertile mind of

a satisfied inventor in his employ than from inventions grudgingly given and grudgingly, if at all, paid for. Moreover, the public at large would derive great advantage from the promotion of technical progress resulting from increased inventiveness.

Therefore, it seems worth while to investigate whether there is perhaps a procedure which is fair both to the employer and the employee; let us take first of all the alternative mentioned in the decision of the Chancery Division quoted above. In the U.S.A. only the inventor himself can take out a patent, but he may be obliged, under a contract, to assign it to his employer. Should he fail to do so the employer would still automatically acquire the "shop right," *i.e.*, the right of user, and the patentee cannot prevent him from continuing to use an invention made or developed in his business. Thus the legitimate interests of the employer are safeguarded. A similar practice has been adopted in this country by agreement between Government Departments and their employees by which the use of the invention for the Crown is reserved but the inventor is left free to exploit the invention commercially, both at home and abroad (*see* Report of the Chartered Institute of Patent Agents, 1943, on "Inventors and Employers," p. 6.)

"Shop Right"

By adopting this principle of "shop right" as the governing principle for inventions, the major obstacle to leaving the employee in possession of his inventions made or evolved in the course of his employment would be removed. However, even this use of the employee's invention should find a special reward as distinct from his normal wage or salary, unless, of course, the employee is especially employed as an inventor at a salary so high that it can be considered as a retaining fee for his inventiveness. Such an employment should be clearly distinguished from that of an ordinary member of the design, production, or research staff.

The employee should also be notified within reasonable time, say, four months, whether the employer wants to make use of any priority claim on acquiring his invention as a whole conferred to him either by agreement or by law. It is a grievance often encountered at present that employees are sometimes left in the dark as to the intentions of their employer who may not show any interest in an invention while the employment lasts, and years after its termination, when the inventor may have founded a new career on his patent, may take it away from him and even recover damages from the inventor for having disclosed the invention to a third party or for having allowed it to be used. The obvious remedy would be to leave the employee in possession of his invention—apart from the above-mentioned right of user of the employer—if the employer fails to claim his priority rights over the invention within a prescribed period.

There should also be a safeguard against the shelving of an invention in cases where the inventor's remuneration is based on the turnover or otherwise on the extent of its use. In such cases the remuneration should be based on the economic value that the invention would have had when used. Moreover, financial benefits derived by the employer through licences or sales of the patent to a third party, at home or abroad, should be taken into consideration. If changes of circumstances occur after the remuneration has been fixed which would bring the economic value of the invention to the employer substantially out of proportion with the agreed remuneration, the employee (and for that matter also the free-lance inventor) should be entitled to a revision of his agreement.

On the other hand, the employer should not be forced to maintain a patent at his expense in which he has no longer an adequate interest. At present the employer may simply drop the patent and the inventor has no claim for taking it over. Here again the remedy would be simply to free the employer from any obligation to continue the use of, and the payment of remuneration for, an invention as soon as he has given notice to the inventor that he may maintain the patent in force at his own expense and have it transferred back to him or to a third party nominated by him.

Some Essential Distinctions

A distinction has to be made between various groups of inventions according to the relation of their subject-matter to the employer's business, to the status of the inventor in the employer's business, and to the use made of the employer's time, equipment, suggestions or advice when developing an invention. Inventions which are not pertinent to the employer's business are at present considered to be the inventor's property by common law. Sometimes, however, employees have to sign an agreement when taking up employment to the effect that any invention made or developed by them during the term of employment shall become the employer's property. The validity of such clauses is doubtful even now because they imply an undue restraint of trade, but they should be positively declared void.

Inventions made by workmen, clerks, or other employees not engaged in design, research, or organisation of production, are at present considered to be their property even if they fall within the range of business activities of their employers. It is not proposed to worsen the position of such types of employees, but some of the safeguards of the employer's legitimate interests indicated

with reference to the last group of inventions could be extended to them.

This last group comprises inventions made by technicians or scientists in the field of the business activities of their employer. Here it is contended, an invention made in the free time of the employee, or without the use of the employer's equipment, etc., or by a man receiving only a modest wage or salary for his routine work, should find a higher remuneration than an invention made or developed during working hours, with the use of the employer's advice, experience, or equipment, or by an employee who, without being employed specially for making inventions, receives a high salary. In this last group the contributions of the employer to the invention should be items of deduction from the inventor's remuneration. The employer could even retain a claim on a percentage of any benefits the employee might derive from such an invention after it had been handed back to the inventor.

Some Progressive Legislation

The suggestions made here are by no means purely academic; they are based on practical experience dating as far back as 1897 when the Patents Act of Francis Joseph's semi-feudal Austrian Empire contained the remarkably progressive Section 5, according to which workmen, employees, and public servants were to be considered the originators of the inventions made by them in the course of their duties, and agreements or regulations tending to deprive the inventor of an appropriate reward were to have no legal effect.

When, in 1918, the Czechoslovakian Republic adopted the Imperial Austrian Patents Act, 1897, Czechoslovakian inventors enjoyed the advantage of one of the most progressive laws. The Austrian Republic, in the Patents Act, 1925, went even further, and most of the suggestions made in this article are based on the Austrian Patents Act, 1925, which also provided the legal machinery for its being carried out. It is interesting to find that in most cases the terms between employer and employee were settled by agreement, without any proceedings in court. Dr. Paul Abel, a prominent Austrian lawyer now living in this country, has published a concise summary of this Act in a letter to *Nature* (1944, p. 716) and the complete text is published in *La Propriété Industrielle* (No. 6, p. 110, June 30, 1926).

La Propriété Industrielle has also repeatedly published reports on the proceedings of the Permanent Commission for the Protection of Industrial Property and of the International Chamber of Commerce where, time and again, the suggestion has been made to recognise, by international convention or by national legislation, the financial rights of the employed inventor in patents taken out for his inventions made in the course of his employment. No agreement beyond a recommendation of that principle was reached before the war, but the time has surely come to carry it out in practice.

I.C.I. Overseas

War Work in Australia and New Zealand

SEVERAL new developments are mentioned in the 16th annual report of Imperial Chemical Industries of Australia and New Zealand, Ltd., for the year ended September 30, 1944. Sales to the Defence Department were lower by a third than in 1943, but commercial sales were higher, resulting in a net reduction of only 4 per cent. New Zealand sales, abnormally high in 1943, returned to the level of previous years. Production was restricted by the shortage of manpower, which was most marked in the explosives section, but operation of plants under control of the Ministry of Munitions was maintained, including a plant for the production of sulphamerazine. The completion of the factory at Botany was retarded by scarcity of tradesmen and delayed deliveries of plant.

Production has now started of liquid chlorine, caustic soda, hydrochloric acid, ferric chloride, carbon bisulphide, phenothiazine, rubber chemicals, and carbon tetrachloride, the last on behalf of Albright and Wilson (Australia) Pty., Ltd. However, a shortage of workers must be relieved before the factory can operate at full capacity. Plants for the production of aniline, diphenylamine, nitrobenzene, formaldehyde, and DDT have now been completed and brought into operation. Erection of the plant for the plasticising of polyvinyl chloride is well advanced. In view of enhanced costs of construction owing to war conditions, a reserve of £100,000 has been created for the special depreciation of wartime expenditure.

Capital expenditure at the factories during the year was £481,564. In view of this, and to complete the programme, an issue of 500,000 ordinary shares was made, which will be fully subscribed during the year.

Profit for the year, including subsidiaries, was little changed at £394,566 (compared with £397,616 in the previous year and £372,546 two years ago), equal to about 5¾ per cent. (7½ per cent.). A preference dividend of 5 per cent. and an ordinary dividend of 5 per cent. were declared. After £100,000 to create the special wartime depreciation reserve, the parent company carries forward £35,165 compared with £43,697 brought in.

Progress in the Provinces

(Reports from a Chemical Engineering Correspondent)

LANCASHIRE

IT is expected that the establishment at Manchester University of the I.C.I. research fellowships in chemistry, physics or allied sciences will speed up the output of research in the sciences which have a direct relation to chemical engineering interests. It is recognised that the large measure of success which has attended the design and use of chemical engineering equipment is due largely to intensive research and the possession of specialised knowledge of fundamental principles and their correct application, and it is believed that the efficient and economical use of chemicals will be still further enriched by many contributions which local firms will be able to make.

Naturally, there has been some recession in war requirements, but generally speaking, the demand for chemical products is being maintained at a high level. Owing to concentration on the war effort, the output available for overseas markets has been curtailed, although the delay in shipments of dyestuffs and pharmaceuticals has now been largely recovered. The ability to increase export business depends on the rapidity of the release of men from the fighting forces, also on the availability of shipping and the allocation of material. Some firms have very large order books, and hope by new methods of production and the acquisition of new and additional plant to increase output.

Oil-Bath Windmill

In this connection a reference to the nature of some of the more recent installations may be of good general interest. For instance, an oil-bath windmill which is substantial and compact as regards both design and workmanship, is ensuring improved pumping service and enabling production to be carried out with efficiency and greater expedition. The gear-box or main casting is of cast iron, accurately machined to take the component parts, and the helmet which covers the mechanism is made from sheet steel welded throughout and hot-galvanised after manufacture. The large-diameter wheelshaft is made from high quality steel and precision ground, and the pinions are keyed to this shaft. On every revolution, all the mechanism is completely covered with oil, and as an oil thrower is fitted to retain all oil after it has lubricated the ball-bearings, none can leak from the gear-box along the wheelshaft. The double gears are machine-cut from solid metal; the pinions are of steel, and these together give a ratio of about 3 to 1, *i.e.*, three revolutions of windwheel to one complete stroke of pump rod. The tower is well designed and appears strongly built.

Another improved unit is a mixing machine with a new and original action and fitted with a single blade with two wings. The blade is covered with white annealed enamel guaranteed not to chip, and the mix is turned out perfectly clean and clear and does not adhere to the pan, the peculiar action ensuring that all particles are thoroughly incorporated. The motion of the mixer is slow, but a perfect dough, for example, can be turned out in about 3½ minutes, or 12 batches per hour. The construction of this machine is substantial; the base is massive, and all the gearing is of the machine-cut, silent type, enclosed in iron guards. The main bearings are fitted with gun-metal bushes, and the driving is by means of friction disc controlled by hand wheel, while leakage of liquor or oil is impossible either outwards or inwards.

Conveyors

An analysis of the labour costs incurred in the internal carrying of certain products reveals the need for more mechanical handling equipment. The slat conveyors used in this area usually consist of two parallel chains across which are bolted slats of metal or hard wood to form a continuous moving platform. The belt conveyors consist of a continuous belt maintained at a proper tension between two rollers, one of which is power driven. These are used for handling a wide variety of chemical products; but where small parts are assembled, both time and money can be saved by the use of a new patented conveyor on which the finished product is put for transfer to "Stores" or "Dispatch" without any intermediate handling or labour. In a layout for assembling small units, two conveyors are used, the upper conveying to the operators the particular components they require, and the lower conveyor distributing from one bench to the next for subsequent operations.

Firms producing valves and gauges are providing extra capacity for their normal work, and during recent months a number of large contracts have been released. A few chemical manufacturers recently made modest price increases, but for the most part these are lagging well behind the cost of wages and fuel. Paint manufacturers report an expansion in their output, and one of the leading firms has increased its investments in subsidiaries whose work hitherto has been carried on under abnor-

mal and difficult conditions. Instead of being so dependent upon imports, the local chemical industry now finds itself well organised in most departments. By the selection of the most modern plant, an uninterrupted flow of production can now be assured at a relatively low cost. This, however, is involving the constant preoccupation of engineers with initial surveys for the purpose of determining the precise nature of the problems to be solved.

YORKSHIRE

The chemical industry in the Sheffield area is now facing a responsibility as great as, if not greater than, the task it assumed in making Britain an arsenal of democracy, and thousands of men released from the Armed Services will soon be seeking employment. Jobs will have to be provided for all who are willing and able to work, and given favourable conditions under which the industry can operate, this problem can be solved. The demand for various consumer goods which up to the present have been manufactured on a restricted basis, if at all, is likely to be enormous, and exhaustive surveys have already determined what new products can be made for immediate exploitation, what existing products can be further developed, with a prospective increase in the volume of sales.

Over a long period some firms have provided regular employment for a large number of men under somewhat difficult conditions, and the declining demand for their products and the extreme severity of the transport restrictions, together with the operation of departmental controls and the limitation of coal supplies, are now working to their disadvantage. But with the prospects of a restoration of freedom for competitive prices and a future reduction of taxation, plans are being put into operation for the absorption of productive capacity, and technical departments are busily engaged in adapting war-time experience to the pursuits of peace. Unexecuted orders remain at a satisfactory level, and without any artificial stimulus or high pressure, it should be possible to maintain continuous full employment, provided that as many specialists and skilled workers as possible are released quickly. Quite a number of schemes involving capital expenditure will soon be launched, and these are expected to result in considerable economies. A good deal of attention is also being devoted to export business.

For a number of years a process of producing zinc-coated wire has been practised locally, and this well-tried process is now being extended. The zinc is obtained from zinc concentrates which are bleached in sulphuric acid to produce a solution of zinc sulphate, and this is carefully filtered and purified. Together with appropriate quantities of acid, the solution is then used as an electrolyte from which the zinc is deposited direct on to the wire. The coats so obtained are of remarkable purity and they can be applied, within reason, of course, to any desired thickness. When three or four times the thickness of the coats usually found in hot galvanised wire have been deposited, ductility is preserved to an extent sufficient to permit the wire being wrapped round a spindle having a diameter equal to itself, without any suspicion of zinc flaking or peeling. Undoubtedly, this process represents a tremendous advance in the home production of zinc-coated wire.

The magnitude of plant and equipment depreciation, and the consequent decline in the capital value of productive assets generally, constitutes a problem which demands the serious attention of all engineers, and particularly perhaps in connection with the use of boilers. While the majority of firms in control of large power plants now have at their disposal the very latest refinements in such matters as feed-water treatment and de-aerating, the great trouble with boilers is, of course, the formation of scale, and while proper filtration can do much to reduce scale, the timely protection of the internal surfaces from corrosion and excessive wear is a difficulty that cannot always be overcome. Satisfactory results are being obtained, however, from the use of a special protective coating, and this is regularly used to counteract pitting which is usually associated with bronze.

Heat-Treatment Plant

At a works near Leeds alterations are being made to plant used for the heat-treatment of parts, and operations of a similar nature. A feature of this development is the installation of furnaces which are fired by automatic gas machines burning bituminous coal, the parts being conveyed at ground level by means of a platform trolley running on a prepared track, and lifting operations done by a travelling crane. The fuel is conveyed to the hopper and by the overhead system to the fuel bed, and positive agitation is ensured by the action of the grate which is of the inclined suspended rocking type. The refractory lining of the fuel chamber is constructed within a water-cooled casing and maintained at a temperature which prevents adhesion of the clinker and the need for hand poking. The machine has automatic control for supplying the necessary volume of air for the desired gasification, and the resultant gas or heat delivered is maintained for short or extended periods without further attention. When normalising, the components are maintained at 1000° C. for five hours, and tempering in the furnaces is carried out at 660°-670° C. for three hours and followed by oil-quenching.

There has been a sharp increase in the

number of bright annealing plants installed in the North, and the great majority of these employ electric furnaces of either the batch or the continuous type, thereby enabling the process to be carried out in an artificial gas atmosphere which is independent of the products of combustion of fuel. For the bright annealing of wire or strip or of small parts one particular system employing specially designed batch-type furnaces is widely used. The plant consists of the furnace itself, together with the necessary switchgear, automatic temperature control equipment, and ammonia burners for providing the artificial gas atmosphere. The furnace comprises a cylindrical cover which can be raised or lowered by means of a crane, and two fixed bases each having a gas-tight hood. Each base is used alternately, this reducing the time between the end of one annealing process and the beginning of the next, and increasing the output very considerably. Heating elements are provided in the cover and the bases so that the charge, which is contained in annular baskets surrounding the centre heater, is heated almost entirely by direct radiation. The large area exposed to this radiation gives very even heating and therefore an extremely uniform anneal.

CUMBERLAND

Some interesting new data on the reasons for cracking and breakdown of boiler steel have recently been provided, and the problem has become more complicated as it has been shown that a wide variety of salts in solution need only be present in minute amounts. In some instances the action is very severe. For example, a solution of sodium nitrate and manganese chloride recently started cracks in cold-rolled steel within an hour of immersion, and it has been demonstrated that neither repeated stress nor corrosion fatigue takes any part in the production of boiler cracks. Some substances which are used to prevent cracking do so by changing or producing a new surface film on the steel, but the formation of a film may promote intercrystalline cracking if the conditions are changed. Research has shown that sodium sulphate in various solutions and at different temperatures offers protection only under limited conditions. One or two inorganic chemicals offer some protection against embrittlement, but it has been proved that two groups of *organic* chemicals are much more effective, and as these chemicals are low in price, and are sometimes waste products, their extended use would appear to be an economical application. If a chemical can be found that produces a continuous non-polar layer, it should offer a most satisfactory means of protection.

U.S. Potash Industry in 1944

Record Production and Sales Figures

NEW records were made last year in the United States in the production and sales of potassium salts. According to reports of the Bureau of Mines, 1,578,498 (1,428,840) short tons of marketable potassium salts, containing 834,568 (739,141) short tons of equivalent potash (K_2O) were produced, while a somewhat smaller quantity, 1,543,420 (1,401,271) short tons was sold. Stocks of potassium salts in terms of K_2O in producers' hands at the end of 1944 were 29,763 (13,984) short tons.

Problems of Reserves

The potash industry of the United States is based largely upon the Sylvite (KCl) deposits of the Carlsbad (N. Mex.) region, the potassium-bearing brines of Searles Lake, Calif., and Salduro Marsh, Utah, and the Langbeinite ($K_2SO_4.2MgSO_4$) deposits of the Carlsbad region. Estimates made about 1940 placed the total known resources of water soluble potash in the above deposits at around 90 million tons K_2O, adequate for only about 100 years at the present rate of consumption. On the basis of these estimates the Committee on National Fertilisers and Lime Policy of the Department of Agriculture and War Food Administration urges that greatly intensified efforts be made by the Federal Government to discover new domestic sources of water-soluble potash; that until such deposits are discovered known resources be looked upon as a strategic reserve; and that, if extensive new deposits are not located soon, vigorous steps be taken to curtail the use of American deposits and replace them with imports.

Probable areas where such deposits might be found include the Texas-New Mexico field, the Grand County (Utah) field, and the eastern United States. Salt deposits of the eastern United States have never been tested for potash beds by core drilling, although well-brines show significant quantities of potash, and salt beds containing 8 per cent. KCl have been found in Nova Scotia.

Post-War Outlook

The present potash mines can produce more than normal domestic requirements under peace-time conditions. However, the availability of foreign supplies after the war will limit foreign markets for American potash, and certain potash-producing nations may enter the domestic market in competition with American companies, especially if it is considered advisable to restrict domestic production to conserve resources. Owing to the enlarged food production programmes, the Bureau of Mines concludes, domestic potash output is likely to remain at a high level for some time.

Spain's Chemical Trade

Need for New Sources of Supplies

SPAIN has made strenuous efforts to obtain larger supplies of chemical products from abroad. A few weeks ago, the first cargo of about 6000 tons of Chilean nitrate to reach the country for some time was unloaded, to be followed by 42,000 tons of nitrates by the end of June. As reported briefly in THE CHEMICAL AGE of June 16, the Spanish authorities have also made arrangements for the purchase of what are described as considerable quantities of aniline dyes, mainly in U.S.A. and Great Britain. However, it cannot be denied that the country still suffers from its economic isolation. The arrival of a tanker with petrol or fuel oil is a piece of news so important that it is broadcast by the radio, and imports of essential commodities are barely sufficient to meet the most urgent needs.

Statistics Resumed

Official import statistics have been published again after an interval of five years, and the latest available figures—for 1943—are summarised below.

Spain's Trade in Chemical Products

	Imports (In gold pesetas)	Exports
1940	61,529,012	37,094,029
1941	59,273,492	53,692,438
1942	93,452,638	59,715,601
1943	133,552,725	66,180,651

The most important chemical raw material exported from Spain is pyrites. In 1943, 287,383 metric tons were shipped; against 288,994 in 1942, 161,617 tons to this country, 49,501 tons to U.S.A., and 43,273 tons to Germany. Zinc sulphide exports totalled 26,662 (29,894) tons, of which 22,849 tons went to Germany, and 3813 tons to France. Of wolfram ore shipments of 1397 (159) tons, Great Britain took 953 tons, and Germany 430 tons. Practically all the mercury exports of 314 (273) tons went to Germany. Sodium chloride shipments, chiefly to Brazil, Portugal and British West Africa, are given as 65,539 (118,738) tons, and those of potassium sulphate and chloride, chiefly to this country, with smaller exports to Portugal and France, as 58,722 (74,719) tons. Exports of rosins mainly to Italy and Finland, aggregated 2554 (2331) tons, while those of vegetable products for medical use —to Germany and the U.S.A.—2539 (2421) tons. Saffron shipments totalled 9206 (13,620) kilograms (two-thirds to Germany). Exports of sulphur and superphosphates, 3084 (2034) and 6411 (6686) tons respectively, went mainly to the Canary Islands. Tartaric acid exports totalled 1694 (1235) tons, of which 876 tons went to U.S.A., 301 tons to Great Britain, and 112 tons to Mexico; shipments of tartrates (chiefly to this country) amounted to 440 (1409) tons, and of crude tartar exports (exclusively to Germany) to 744 (1016) tons, while of the exports of 504 (258) tons of cream of tartar, and other purified tartrates, half went to the United States.

Chief Import Figures

The import figures for 1943 can hardly be considered representative of the capacity of the Spanish chemical market, but since no import figures have been published for several years prior to this war, the most important items (1942 figures in brackets) may be of interest: (in tons, unless stated otherwise) pitch 6480 (6903), synthetic dyestuffs 787 (601), stearine 417 (36), essential oils 7500 (9000) lb., earth colours 82 (79), white lead, zinc oxide, and lithopone 119 (135), ultramarine, etc., 549 (796), carbon black, etc., 622 (144), vegetable dyes 34 (279), printing inks 102 (56), bromine 3200 (2800) lb.; bromides 103,000 (181,000) lb., caustic soda and potash 108 (236), magnesium sulphate and chloride 76 (45), copper sulphate 9946 (10,058), insecticides 1314 (1322), Chile saltpetre 27,162 (37,162), synthetic nitrates 15,855 (10,859), cyanamide 2126 (12,181), ammonium sulphate 56,975 (30,324), nitric acid 203 (350), ferrocyanides 58 (201), phosphoric acid and phosphates 50 ((72), boric acid 359 (274), benzoic acid 49 (139), acetic acid 78 (13), lactic acid 33 (79), potassium carbonate 120 (60), oxalic acid 111 (261), formic acid 134 (134), formalin 332 (221), alumina 1852 (1151), aluminium compounds 224 (387), alkaloids 15,000 (16,000) lb., caseine 639 (1129), and rock phosphates 50,039 (23,565).

Market for British Chemicals

Spain's imports were obtained from countries on both sides of the war, mainly from the United States, Germany, Great Britain and Italy, and from neutral Switzerland, as well as from occupied France. Imports of chemicals in 1944 suffered as a result of military operations in Western Europe, and by the overthrow of Fascist Italy, so that it is not likely that the 1943 figures have been equalled last year. Spain, cut off from her German sources of supply, will have to find new suppliers for industrial chemicals, dyes, paints and pharmaceuticals. The inquiry for U.S. and British dyestuffs mentioned above, is already an indication of this changed situation, since in 1943 three-fourths of all Spain's dyestuffs requirements were imported from Germany and Switzerland.

Personal Notes

MR. D. KIRKWOOD, jr., is relinquishing, by agreement with the Minister of Supply, his post as Deputy-Controller for Die-castings and Labour in the Non-Ferrous Metals Control of the Ministry in the light of medical advice following a serious operation.

DR. MOWBRAY RITCHIE, lecturer in the Department of Chemistry, and DR. G. A. LEVVY, Beit Research Fellow in the Department of Biochemistry, have been appointed I.C.I. Industrial Research Fellows by the Court of the University of Edinburgh. DR. A. F. GRAHAM, lecturer in the Department of Biochemistry, has been appointed a Carnegie Teaching Fellow for 1945/46.

MR. R. ANNAN, ex-president of the Institution of Mining and Metallurgy, MR. T. PRIOR, D.S.O., technical adviser to the Ministry of Supply, DR. W. R. JONES, Geological Department of the Royal School of Mines, and MR. G. F. LAYCOCK, consulting engineer, have been appointed members of the technical committee on the future of tin mining in Cornwall.

PROFESSOR D. T. A. TOWNEND, Livesey Professor of Coal Gas and Fuel Industries at Leeds University, has accepted the invitation from the Council of the British Coal Utilisation Research Association to the directorship of the Association. Educated at Bancrofts School, he held an exhibition at the East London (now Queen Mary) College, where he graduated in 1920. Following post-graduate study in Fuel and Chemical Engineering at the Imperial College of Science and Technology, he was associated there for many years with the late Professor W. A. Bone and Professor D. M. Newitt in investigations into combustion and high pressure problems; and held successively a Salters Research Fellowship and a Rockefeller International Research Fellowship. The new director of the B.C.U.R.A. is a leading author in the field of combustion, and discovered, in 1933, the two-stage ignition phenomenon of higher hydrocarbons.

Control Orders Revoked

Nitric Acid and Industrial Ammonia

THE Minister of Supply has made the Control of Nitric Acid No. 2 (Revocation) Order, 1945, and the Control of Industrial Ammonia No. 2 (Revocation) Order, 1945 (S. R. & O. 1945, Nos. 748 and 749). These Orders revoke the Control of Nitric Acid No. 1 Order, 1940, and the Control of Industrial Ammonia No. 1 Order, 1940, which prohibited the production and disposal of nitric acid and ammonia respectively except under licence.

Hydrosol from Carrageen

Industrial Applications in the U.S.

IT was announced in Dublin early this month that the first industrial cargo carried by air to the U.S.A. consisted of carrageen moss which is being converted into a hydrosol in America, as a sequel to a series of experiments made by Mr. G. W. Stoyle in Wollaston, Mass. Mr. Stoyle, who tested several types of seaweed, found that the Irish *Chondrus crispus* best suited his purpose. His patented process involves brief boiling of the moss and then its agitation for 30 minutes to remove the colloid from the gummy resin binding it structurally in the natural moss. A liquid having approximately the consistence of molasses is obtained.

Further claims made are that the hydrosol combines readily with liquids as a wetting agent, emulsifier, binder, or penetrator. It holds in suspension chemical solutions (organic and inorganic) with oils and water for long periods. It can be used particularly to increase coverage and drying speed in printing and lithographic inks. It can be usefully employed in dyes, paint and rubberised fabrics. It is asserted that one ounce of the product doubles the coverage in a pound of printing ink.

Argentine Sulphur

New Deposits Exploited

SOME of Argentina's richest sulphur deposits are in the Provinces of Los Andes, on the Rio Grande properties, at an altitude of 10,700 feet, about 60 miles south of the Socompa Pass. One of the largest and most extensive of these mines, which is really a surface deposit, covers an area of about 11 sq. m. and, at a distance, looks like a snow field. Exploitation was begun in December, 1941, and plans for a great expansion are in hand. The sulphur is of volcanic origin and is from 60 to 80 per cent. pure as dug from the deposits; when refined, it is nearly 100 per cent. pure. Three pressure boilers are used at present to separate the sulphur from the "caliche"—each with a capacity of 20 tons of sulphur a day.

A workers' town is being built at 16,700 feet above sea level which, it is claimed, will be the highest community in the world.

The completion of the new Transandean Railway between Salta in Argentina and Antofagasta in Chile will greatly aid this industry by simplifying the transport problem. An intensification of Argentina's sulphur production will undoubtedly be of importance to the country's industries, which have been expanded considerably during this war.

General News

The Merchant Navy Comforts Service has received the sum of £6 from the staff and workers of I.C.I's Ardeer factory.

The 229th ordinary general meeting of the Society of Glass Technology was held on June 27 in Sheffield, when several papers were read and the council meeting held.

In view of the war in the Far East, a discussion on the mould proofing of leather, held recently in London by the Society of Leather Trades' Chemists, assumes special importance.

Shipping is now available for a limited resumption of private trade to the Channel Islands. A Purchasing Commission has been set up in London to give advice and assistance to traders. (Address: Home Office, 59-67 Great Peter Street, London, S.W.1.)

To inquire into future prospects of the Cornish tin-mining industry and the question of granting assistance from public funds for further underground exploration, the Minister of Fuel and Power has appointed a small technical committee.

The Library of the Chemical Society has recently increased the daily hours of opening which were curtailed during the European war. It is now open from 10 a.m. to 6 p.m. on Mondays to Fridays, and from 10 a.m. to 5 p.m. on Saturdays.

The following items should now be deleted from the list of commodities subject to M.E.S.C. procedure: formaldehyde, arsenious oxide, lead arsenate, paris green, sodium arsenate, sodium arsenite, calcium arsenate, phosphoric acid and phosphates (except phosphate rock). (*See* THE CHEMICAL AGE of January 20.)

The following DTD specifications were issued by the M.A.P.: Hose for use with Hot Oil and Ethylene Glycol (No. 625, superseding No. 411); Alloy Cast Iron for use at Low Temperatures (No. 649, incorporating Amendment List No. 1); Aluminium Alloy Castings for General Purposes (Amendment List No. 3); and Chromium-Nickel Non-Corrodible Steel of 15 tons 0.1 per cent. Proof Stress (Amendment List No. 4).

The latest Trading with the Enemy (Specified Persons) (Amendment) (No. 7) Order, 1945 (S. R. & O. 1945, No. 746), contains about 50 new names of persons and firms with whom dealings of any kind are unlawful. It includes Cia. Distribuidora de Metales y Productos Quimicos S.A. (D.I.M.E.P.S.A.), Madrid; Hidro-Nitro Espanola, S.A., Huesca; Santonin Farmaceutiskt A/B, Stockholm; and the Gesellschaft für Metall und Chemie G.m.b.H., Zürich. A large number of names has been deleted from the list.

From Week to Week

The Combined Production Resources Board announces that a further conference of great importance to the industries of this country, the United States and Canada, will be held in Canada in the autumn in order to discuss differences in Anglo-American engineering practices and standards of measurement.

The outstanding achievement of the Permutit Company during the war has been the development and manufacture of the Permutit sea-water de-salting apparatus for producing drinking water from sea water without the use of heat. It saved the lives of airmen forced down into the sea far from land.

A revised edition of the Factory Department's Memorandum on Carbon Monoxide Poisoning has just been issued (H.M.S.O., 6d.). Special reference is made to industrial CO-poisoning hazards from blast furnaces, gas producers, and gasworks and coke ovens, as well as miscellaneous causes; and chapters are devoted to layout and maintenance of plant, detection and estimation of the gas, and treatment of cases.

Foreign News

The U.S. House of Representatives has approved and passed on to the Senate legislation exempting oil-drilling costs from taxes.

Out of 1066 Chinese Industrial Co-operatives, with a membership of over 100,000, 242 were producing chemicals.

An export tax on fluorspar amounting to U.S. $0.75 a ton has been established in Bolivia.

Penicillin is being produced at Astrida, in Urundi, Belgian Congo. It is being used in the hospitals for the native inhabitants.

The insulin plant of the I. G. Farbenindustrie at Hoechst has now resumed production.

In Mysore, there are now 605 large industrial establishments, employing over 77,000 persons.

In India, valuable metal is now being recovered from obsolete and unserviceable aeroplanes and diverted to the caste-ware industry.

Sinking of wells in an oilfield discovered a year ago at Kiangyu, 200 miles north-west of Chungking, where already 300 tons of equipment have arrived, will begin in August.

The Kenya Pyrethrum Board reports that deliveries for last year were 6547 tons, a record since the industry was established in 1935 with an initial output of 321 tons. Kenya's chief competitor is at present Brazil, with an annual production of about 1200 tons.

A DDT plant has been erected at the works of Hygeia, Ltd., manufacturing chemists, Galway, and is now supplying the Irish market.

A new plant at Shawinigan Falls for the production of chloral from acetaldehyde and chlorine is to be built by Shawinigan Chemicals, Ltd.

Peruvian imports of dyestuffs remained practically unchanged at 12,000,000 soles last year, as compared with 8,900,000 soles in 1942.

All production at the mine and works of the Indian Copper Corporation has been temporarily stopped owing to the exhaustion of coal stocks.

Speaking at the jubilee session of the Academy of Sciences of the U.S.S.R., Professor Kapitsa outlined a project for the freer exchange of scientific knowledge between nations.

A laboratory will be erected in Ottawa at a cost of $1,000,000, to house laboratories of the Department of Health and Welfare and to further scientific research in the Dominion, the Minister of Health announced.

Penicillin research in France is to be encouraged by a grant of fr.10,000,000 to the Pasteur Institute, made by the Minister of Public Health, in agreement with the Minister of Finance.

Copper sulphate will be produced in France in time for the viticultural season, but vine-growers have been warned that total production will not exceed 17,000 tons. Imports will amount to some 20,000 tons.

In Spanish Morocco, there are at present 19 tile- and cement-pipe factories. A factory planned for the production of glazed and roofing tile will have a daily output of 15,000 kilograms.

Mining supplies imported into Sicily in 1944 included 3019 quintals of calcium carbide, 307,900 units of detonator caps, 1491 pounds of explosives, and 308,352 metres of safety fuse.

An export duty of 5 per cent. has been established in Ecuador on quinine and its derivatives, while quinine salts of all kinds have been placed under the exclusive control of the Ministry of Health in Mexico.

The Portuguese Department of Mines is exploring potash deposits between Lisbon and Coimbra. Drilling has been started and two test borings have been made to a depth of 2600 feet, but results are not yet known.

The present settlement of the dispute between Italy and Yugoslavia leaves the latter with all Istria except the towns of Trieste and Pola. These regions supplied 30 per cent. of Italy's coal requirements, and about 20 per cent. of both her bauxite and mercury production.

The opening of the Ledo-Burma Road will permit the United States to expedite transport of materials for drilling oil wells and for increasing refinery capacity within China.

Valonia production in Turkey during 1944 has been estimated at about 30,000 metric tons, compared with 55,000 tons in 1943. Some 10,000 tons of the 1944 crop have been classified as not marketable. None of the crop was exported, and the disposal of surpluses became a serious problem.

Argentina's imports of certain iron and steel products in 1944 (1943 in brackets), were as follows (in tons): pig iron 19,555 (21,520); galvanised sheets, 7914 (1486); tin-plate and scrap, 35,798 (29,252); ferro-manganese, 1273 (3127); ferro-silicon, 1196 (1318).

The Netherland Indies Board is purchasing much new equipment in the United States for processing cinchona bark, including 25 huge drying ovens capable of processing 2200 lb. of dried bark daily. The Japanese have not destroyed trees or machinery as they too need quinine urgently.

Deposits of borates are known to exist in Iran in the vicinity of Debschuturan, and in the North near Sabsevar. Those near Debschuturan are considered as more important. Limited operations are now in progress in that area, but the Sabsevar deposits are not being worked. The crude material goes to Tehran for refining, annual output aggregating about 100 tons.

Several million tons of bauxite have been marked out by Bureau of Mines engineers during the past three years in an area of about 1400 sq. miles in the central Arkansas bauxite belt, and about ten million tons of bauxite of a grade suitable for direct use by industry for metals, abrasives and chemicals were ascertained in Saline and Pulaski counties. This is equivalent to a 12-year supply of commercial bauxite at the normal peace-time rate of consumption in the United States. In addition, the Bureau charted eighteen million tons of high-alumina clay, and estimates the indicated and inferred clays at about 73 million tons.

Forthcoming Events

June 30.—The Association for Scientific Photography. Alliance Hall, Westminster, S.W.1. 2.30 p.m. Mr. Harold White: "Make the Photograph Tell a Story."

July 12 and 13. Society of Chemical Industry. Annual general meeting. July 12. Chemical Society's Rooms, Burlington House, Piccadilly, London, W.1. 10.30 a.m., meeting of chairmen and hon. secretaries of sections and groups; 2.15 p.m., meeting of council. July 13: The Royal Institution, Albemarle Street, London, W.1. 10.30 a.m.

business meeting; 11.30 a.m., President's address; 12.30 p.m., lunch at the Savoy Hotel; 3 p.m., presentation of the Society's Medal to Viscount Leverhulme and Medallist's address; 4 p.m., tea in the Long Library.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an * — followed by the date of the Summary, but such total may have been reduced.)

PATON CALVERT & CO., LTD. (formerly MATCHLESS METAL POLISH CO., LTD.), Liverpool. (M., 30/6/45.) June 2, £49,400 debentures; general charge. *£53,700. April 11, 1945.

MERRIMANS FILTERING MEDIA, LTD. (formerly MERRIMANS CLINKER CO., LTD.), Hillingdon. (M., 30/6/45.) June 5, mortgage, to Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on Merrimans, 109 West Drayton Road, Hillingdon. *£2816. November 26, 1943.

BROOKS' DYE WORKS, LTD., Bristol. (M., 30/6/45.) June 5, charge, to Bristol Permanent Economic Building Society, securing £1500 and any other moneys, etc.; charged on 325 Wells Road, Knowle, Bristol. *£25,094. April 14, 1945.

Satisfaction

YORKSHIRE LIMESTONE CO., LTD., Womersley. (M.S., 30/6/45.) Satisfaction June 6, of charge registered March 25, 1936.

County Court Judgments

FIDLER, Roy S., 2 Kidderminster Place (over 160 London Road), West Croydon, chemical engineer. (C.C., 30/6/45.) £29 9s. 7d. April 18.

HAZELL CHEMICAL PRODUCTS, LTD., 30 City Road, E.C., dealers in chemical products. (C.C., 30/6/45.) £30 0s. 5d. May 1.

Company News

Turner and Newall, Ltd., have declared an interim dividend of 3¾ per cent. (same).

The Aluminium Development Association (*see* THE CHEMICAL AGE of April 21, and May 12) has applied to the B.O.T. for a licence to register the association as a limited company without the addition of "limited."

Cape Asbestos Co., Ltd., reports a net profit, for 1944, before taxation, of £150,678 (£115,250). The ordinary dividend is raised from 15 per cent. to 17½ per cent.

British Tar Products, and the Yorkshire Coking and Chemical Co., announce that the secretarial and registration departments will return to the head office at 11 and 12 Pall Mall, S.W.1, on June 29.

The Chloride Electric Storage Co., Ltd., reports a profit, for the year to March 31, of £526,034 (£517,672). A final dividend of 5 per cent., and a bonus of 5 per cent., make, with the interim, a total distribution of 15 per cent. (same).

The Distillers Company, Ltd., reports a net profit, for the year to May 15 (after taxation and contingencies) of £2,157,663 (£2,086,501). A final dividend of 11½ per cent. (10 per cent.) and a bonus of 2½ per cent. (same) make a total distribution of 20 per cent. (18¾ per cent.)

The Geigy Colour Company, Ltd., Manchester, has changed its name to "The Geigy Company, Ltd.," as from June 1. When first formed, the company was solely concerned with the provision of dyestuffs for the colour-using trades, but in view of the widening field of its activities, which embraces, *inter alia*, the production of insecticides, plasticisers and synthetic tans, the former name was felt to be too restrictive.

Chemical and Allied Stocks and Shares

BUSINESS in stock markets recorded little improvement but sentiment continued to be assisted by the absence of selling. Small gains were shown not only in British Funds, but also by industrials, and hopes as to the outcome of the General Election were also indicated by a rally in home rails.

Shares of companies connected with the chemical and kindred industries were generally firm. Imperial Chemical at 39s. 6d. recorded a further moderate gain, while Turner & Newall changed hands at 82s. Levers at 49s. 3d., and Lever N.V. at 49s. 9d. continued to reflect hopeful anticipations as to the position of the Dutch company. In spite of the increased payment from the Distillers Co. (the 20 per cent. total is an increase of 1½ per cent. over that for the previous year), the £1 units became less active and eased to 116s., but are now "ex" the final dividend and bonus. Possibly the chairman's annual statement will refer to the important war-time work of the Distillers group and to the further growth of its widespread activities. Elsewhere, United Molasses were higher at 43s. 3d., and British Plaster Board changed hands around

37s. 6d. Triplex Glass at 43s. moved up with the shares of motor car manufacturers. Barry & Staines strengthened to 52s. on further consideration of the results. British Match eased to 42s. 3d., British Aluminium were 42s. 3d., but British Oxygen firmed up to 88s. Iron and steels were firm, with Stewarts & Lloyds at 55s. 9d., Thomas & Baldwins at 12s. 1½d., Dorman Long at 27s., Powell Duffryn at 23s. 7½d., and Tube Investments at 118s. 9d. Keith Blackman 10s. shares remained at 41s. on the results, which show the maintained 20 per cent. dividend to be conservative; earnings on the shares are nearly 30 per cent., a further £10,000 being placed to reserve. Greeff-Chemicals Holdings 5s. shares remained at 9s. 3d. on further consideration of the past year's figures. Fully 17½ per cent. was earned on the shares but, as previously announced, the dividend is limited to 10 per cent., the same rate which has ruled since 1939 when 12½ per cent. was paid.

Crittall Manufacturing shares rallied strongly to 28s., and Ruston & Hornsby kept steady at 52s. on the results. United Glass Bottle were 77s. 6d., and Key Glassworks held their recent rise to 72s. 6d., while Forster's Glass 10s. shares remained at 38s. 9d.; the recently-issued report showed that the maintained 15 per cent. dividend was earned with a margin sufficient for the payment of a further 12½ per cent. B. Laporte kept at 87s. 6d., and Monsanto Chemicals 5½ per cent. preference at 23s. Shares of companies connected with base metals were more active, with Amalgamated Metal 19s. 9d., Metal Traders 25s. 6d., and Imperial Smelting 14s. 3d. Elsewhere, General Refractories were steady at 16s. 1½d., Metal Box 91s. 3d., Gas Light & Coke 22s. 7½d., and Low Temperature Carbonisation 2s. shares transferred up to 2s. 9d. Textile shares recorded few movements. Bleachers ordinary were firmer at 13s. 3d. on the payment of preference dividend arrears. Courtaulds were 55s. 3d., and British Celanese 33s. 6d. In other directions, Burt Boulton were 27s. 6d., and Cellon 5s. shares 26s. British Drug Houses remained active, and at 37s. 6d. were again higher on balance.

Boots Drug at 56s. were steady, so were Sangers at 30s. 9d., Timothy Whites at 41s. 9d., and Beechams deferred at 20s. De La Rue strengthened to £10¾, awaiting the full results and the chairman's annual statement; higher profits and maintenance of the 40 per cent. dividend were announced recently. British Industrial Plastics 2-, were 6s. 10½d., and Erinoid 5s. ordinary 11s. 10½d. Oil shares recorded small gains.

British Chemical Prices

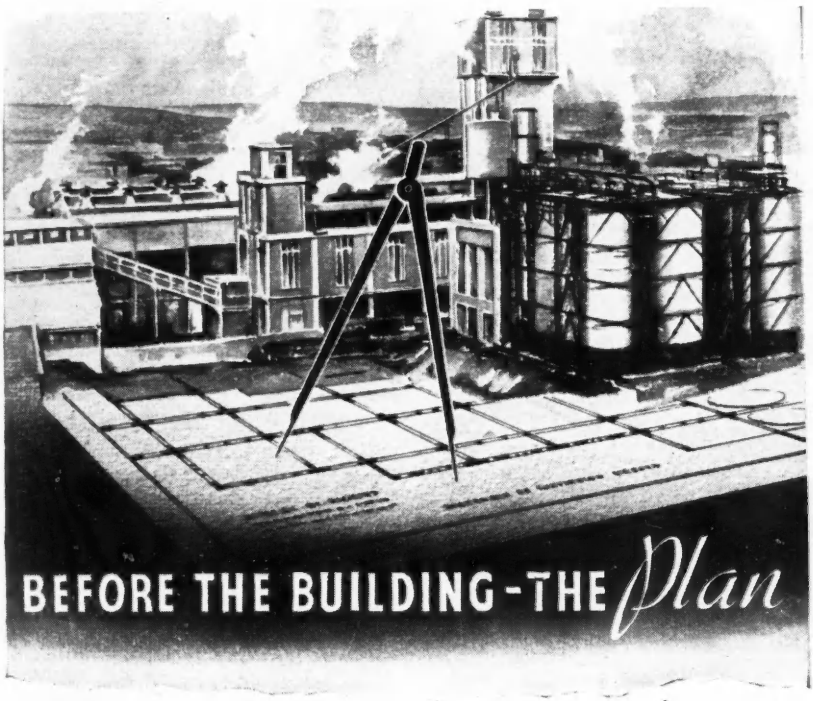
Market Reports

ACTIVE trade is reported this week in most sections of the London chemicals market, although in some directions actual quantities on offer for new business are, of course, restricted by the limited supplies available for other than priority needs. Makers contract deliveries are on a good scale and fairly substantial quantities are reported to be going into consumption. The tone throughout the market is firm. The demand for the majority of the soda products is steady with soda ash, salt cake and Glauber salt in brisk demand, while nitrate of soda is a brisk market. Hyposulphite of soda is active. In the potash section, there is a good inquiry for the limited supplies of some materials including bichromate of potash, caustic potash, permanganate of potash and yellow prussiate of potash. In other directions, formaldehyde is a steady market, as is also borax, white powdered arsenic and the majority of the heavy acids. In the coal-tar products section, there is a steady movement of supplies against contracts with some export business in pitch. Creosote oil and cresylic and carbolic acids are in good demand, while a steady trade is passing in the toluols and benzols.

MANCHESTER.—Seasonally quieter conditions, due chiefly to holidays in the consuming areas, are showing signs of developing on the Manchester chemical market, though the actual effects so far have been only slight. The alkalis and most other heavy chemicals are being taken up fairly freely under contract commitments and some new business for the home trade has been done. Export inquiry seems to be expanding slightly. In the fertiliser trade, conditions in most sections are quieter, as is usual at this time of the year. In the tar products market, creosote oil and the toluols and benzols seem to be the most active, with a certain amount of export business passing in road tar and pitch.

GLASGOW.—In the Scottish heavy chemical trade, there has been an improvement during the past week for home business. Prices remain firm with no actual changes to report. Export inquiries are being received regularly.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in this paper should not be taken as an indication that they are necessarily available for export.



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